United States Patent

Koppe

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[54] INTERCHANGEABLE CARTON HOLDER FOR CHAIN CONVEYOR

[72] Inventor: **Robert G. Koppe**, Buffalo Grove, Ill.

[73] Assignee: **Exact Weight Scale Corporation**

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[52] **U.S. Cl.** **198/131**, 141/165

[51] **Int. Cl.** **B65g 15/00**

[58] **Field of Search** 198/131, 189; 141/165, 152, 141/177

[56] **References Cited**

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Primary Examiner—Richard E. Aegerter
Assistant Examiner—H. S. Lane
Attorney—Mann, Brown, McWilliams & Bradway

[57] **ABSTRACT**

Carton filling mechanism in which a chain carries cartons past a filling station. Carton blank holders of different sizes for different sizes of cartons are snap-fitted over support blocks on the chain, enabling rapid changeover from one carton size to another.

4 Claims, 10 Drawing Figures

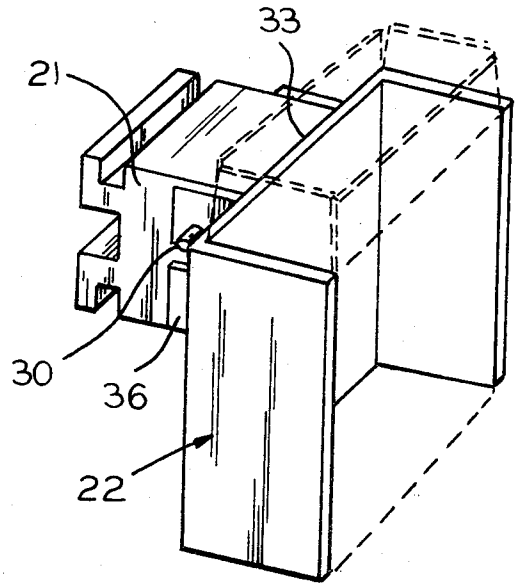
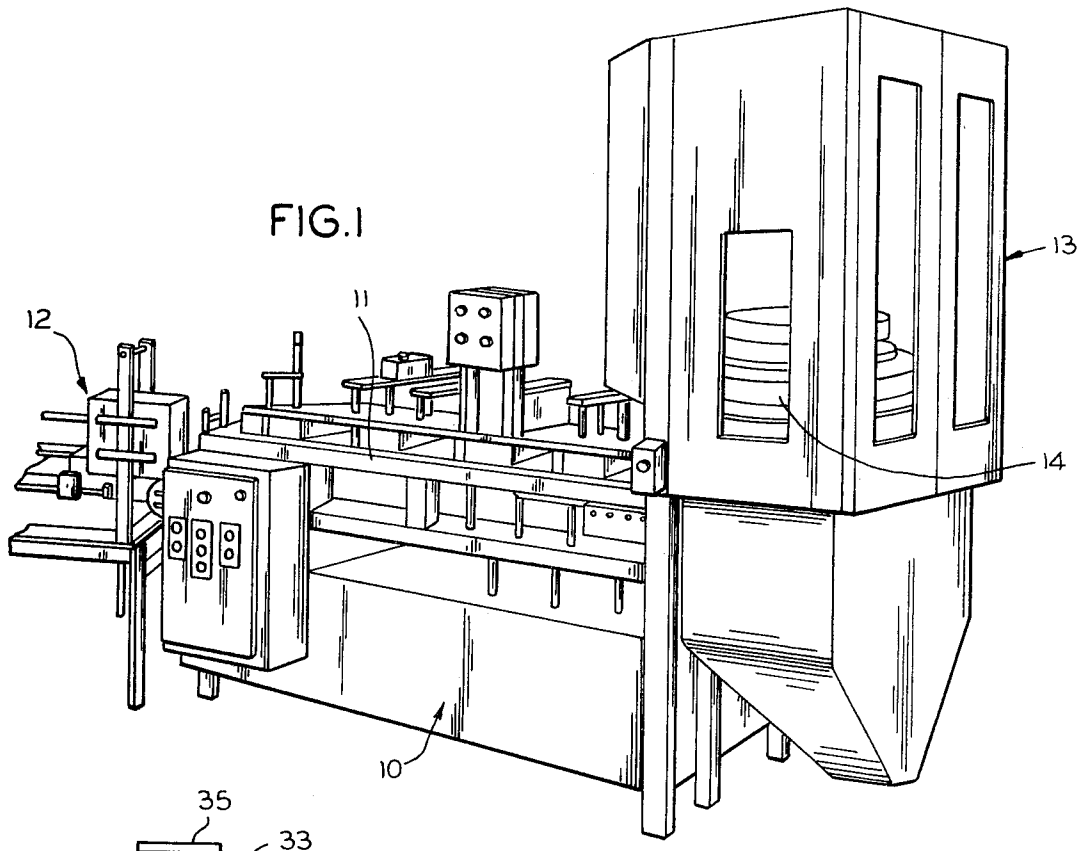


FIG.1



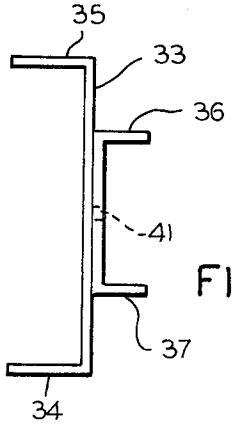


FIG.4

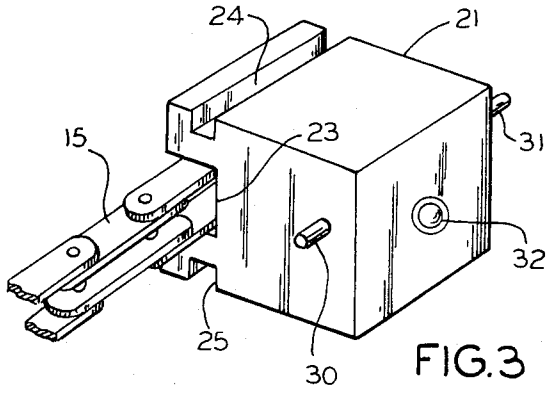


FIG.3

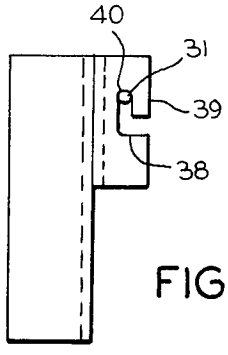


FIG.5

INVENTOR
ROBERT G. KOPPE

BY
Mann, Brown, McWilliams & Bradbury
ATTORNEYS

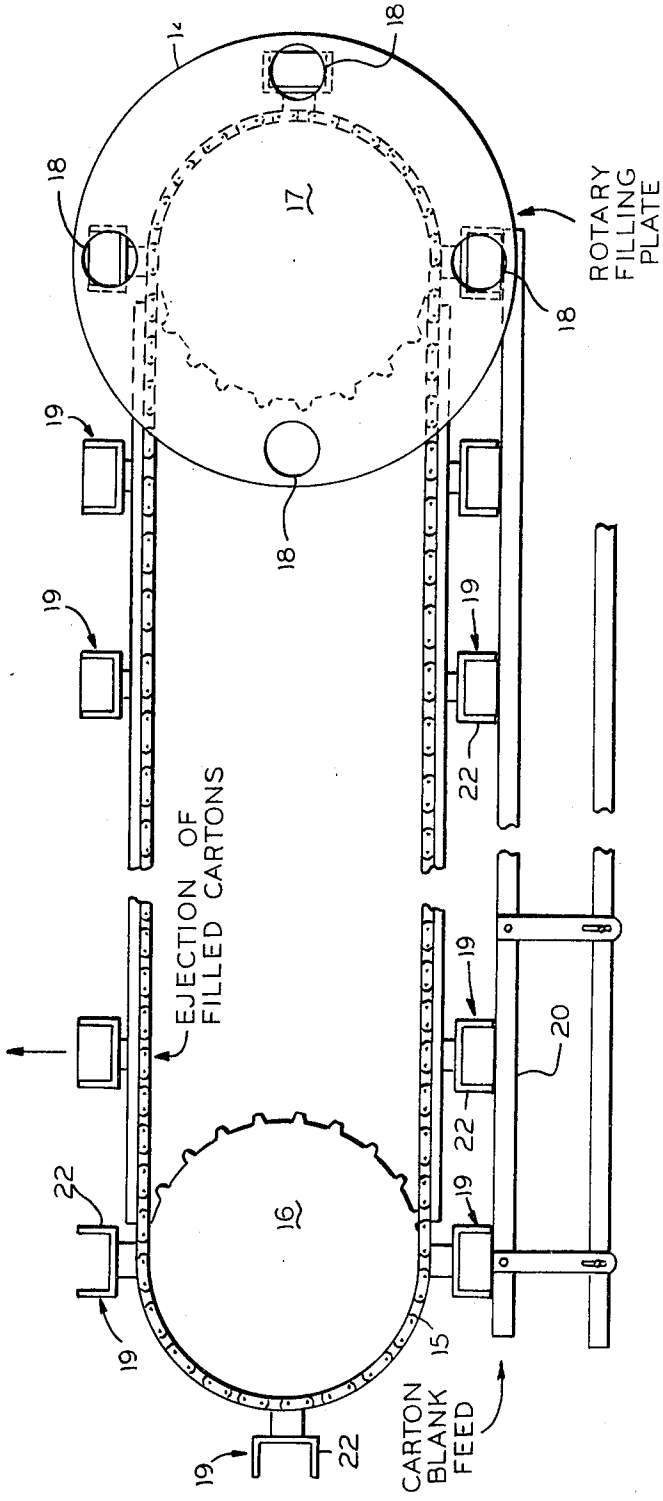


FIG.2

INVENTOR
ROBERT G. KOPPE

BY
Mann, Brown, McWilliams & Bradway
ATTORNEYS

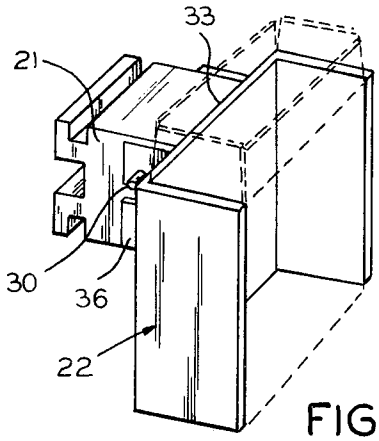


FIG.6

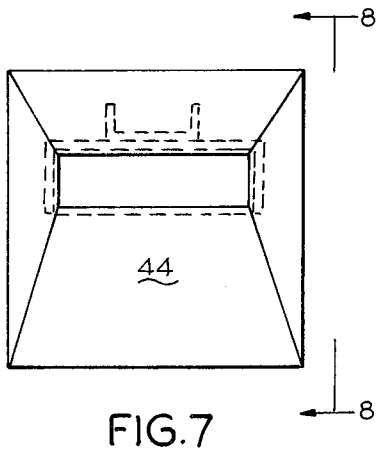


FIG.7

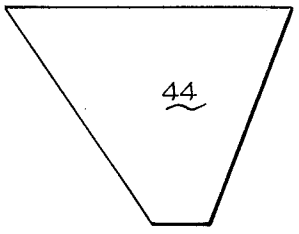


FIG.8

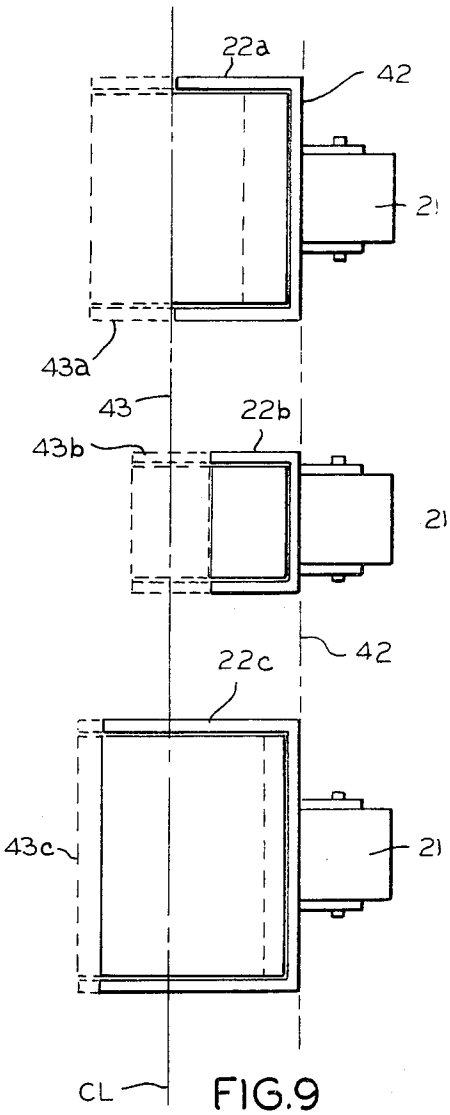


FIG.9

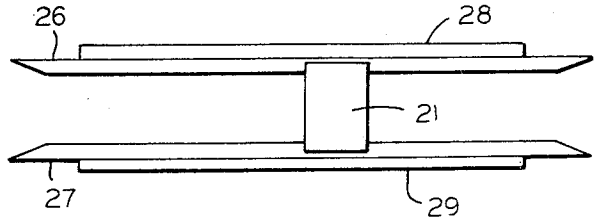


FIG.10

INVENTOR
ROBERT G. KOPPE

BY
Mann, Brown, McWilliams & Bradbury
ATTORNEYS

INTERCHANGEABLE CARTON HOLDER FOR CHAIN CONVEYOR

The present invention is directed to carton filling machines in which folding carton blanks are fed to an endless conveyor chain and carried past a filling station, and is particularly concerned with improvements in facilities for holding and transporting the cartons in the machine.

Carton filling machines oftentimes take the form of an endless conveyor chain traveling in a horizontal path and with carton holders carried by support blocks at spaced points on the chain. Carton blanks are fed to the holders and, during transport of the blanks, adhesive is applied to the flaps and forming shoes tuck the flaps of the blank. After the bottom flaps are tucked and closed, the chain carries the cartons past a filling head which sometimes takes the form of a rotary filler plate with spaced openings. The filler plate moves in synchronism with movement of the chain and, as a carton is aligned under an opening in a filler plate, material is automatically discharged through the opening into the carton so as to fill the carton. After the filling operation, the top flaps of the carton are glued and tucked so as to close the top of the carton. Other forms of filling mechanisms, such as net weight scales can be used in machines of this type. Prior machines of this class have used carton holders comprised of a support block which is removably attached to a support on the chain and which engages one side face of the block. Spaced members are fixed to and extend transversely to the support block so as to define, with the support block, the length and width of the carton. A guide rail is spaced outwardly from the conveyor chain so as to slidingly embrace the fourth side of the carton. Mechanisms of this class have used varying widths of support blocks or support blocks with varying widths of spacers and variant spacing of the transverse members to accommodate different sizes of cartons so that the center of the carton, regardless of size accommodated, is always a fixed distance from the conveyor chain. This type of carton holding structure is relatively heavy, particularly if large spacers are used for the smaller width cartons, and the weight thereof acts in a cantilever fashion upon the conveyor chain, which necessitates use of relatively heavy and sturdy chain and sprocket structures to accommodate the weight. Also, structures of this general type, due to the several parts involved, require considerable machine "down time" in which to change the machine from one carton size to another.

With the foregoing in mind, the primary objects of the present invention are to provide carton forming machines with improved carton support facilities in which the carton supports are relatively light in weight, so that they can be quickly and easily attached to and removed from the conveyor chain, to simplify the conveyor facilities for cartons in a manner enabling lighter weight chain and sprocket structures, while forming the structure in such a way that cartons are positively and effectively moved through the successive blank receiving, flap tucking and sealing, filling and carton ejection steps in the machine.

These and other purposes will appear from time to time in the course of the ensuing specification and claims when taken with the accompanying drawings, in which:

FIG. 1 is a perspective view generally illustrating the type of carton filling mechanism to which the present invention is applicable;

FIG. 2 is a diagrammatic plan view of the carton conveyor chain, carton holding facilities, and filling and ejection facilities utilized in the present invention;

FIG. 3 is a perspective view of a support attached to the conveyor chain, as illustrated in FIG. 2;

FIG. 4 is a plan view of carton holders utilized in the invention;

FIG. 5 is an end view of the carton holder illustrated in FIG. 4;

FIG. 6 is a side view of the assembled support and carton holder illustrated in FIGS. 3, 4 and 5;

FIG. 7 is a plan view of filling spouts utilized with the present invention;

FIG. 8 is a side view of a filling spout as represented in FIG. 7;

FIG. 9 is a diagrammatic view illustrating variant sizes of carton holders which may be utilized with the invention and illustrating certain principles and advantages realized in the present invention; and

FIG. 10 is a side view of certain guide rails utilized with the conveyor chain and carton holding facilities of FIGS. 2–6.

Like elements are designated by like characters throughout the specification and drawings.

With specific reference now to the drawings, and in the first instance to FIG. 1, the frame of a typical carton filling machine to which the present invention is applicable is designated by the numeral 10. Frame 10 serves as a support for the various elements of the machine including guide structures generally designated at 11 for a conveyor chain and carton blanks carried thereby. A carton blank feeding accessory 12 is positioned at one end of the machine for delivering flat carton blanks to the conveyor chain of the machine in timed relation to the movement of the conveyor chain. The conveyor chain has carton blank holders carried thereby which carry the cartons past flap tucking or folding and sealing facilities and past a filling station generally represented at 13 in FIG. 1. Filling station 13 may include a rotary plate 14 having a series of spaced openings therein. The filler plate receives material from a hopper and rotates in synchronized relation to the movement of the carton conveying chain. Automatic facilities control gates for the openings in the filler plate so that a predetermined volume of material flows to a carton when the carton is properly aligned with a filler opening. Carton filling machines as thus generally described are known to the art. It should be understood that other types of filling facilities can be used with carton conveying mechanism of this type.

The conveying chain facilities and rotary filler plate are diagrammatically represented in FIG. 2. In FIG. 2 the endless chain 15 travels in a horizontal path around spaced sprockets 16 and 17, one of which is driven. The carton blank feeding facility is located adjacent one sprocket as, for example, sprocket 16, and the other sprocket 17 may be generally coaxial with the rotary filling plate 14. The openings in the filling plate are generally designated at 18. The conveyor chain carries a plurality of carton holding facilities generally designated at 19 at equally spaced intervals along the length of the chain. The carton holding facilities are adapted to embrace three sides of a carton and the fourth or outer side is slidably engaged by a guide rail 20. Guide rail 20 is supported by the frame of the machine and is adjustable inwardly and outwardly with respect to the chain 15 so as to accommodate different dimensions of cartons. A guide rail similar to rail 20 is also positioned opposite the other free run of the chain.

Machines of this class may carry carton flap folding shoes and flap sealing facilities which are known to the art and for this reason they are not illustrated herein. The conveyor chain is adapted to pick up flat carton blanks at the location designated in FIG. 2, form them to the proper configuration, and close the bottom of the cartons before they pass under the rotary filling plate 14 where they are filled with material and then conveyed past further flap folding facilities and sealing facilities for the top of the carton. The cartons may then pass an ejecting station, as generally represented in FIG. 2, where the filled and closed cartons are ejected from the machine.

It should be understood that while the machine is disclosed with flap sealing and ejecting facilities, the invention is not limited to use with machines having such facilities. The invention disclosed herein may be used also with machines adapted for tuck flap cartons wherein no sealing facilities are required.

In accordance with the present invention, the carton forming and holding facilities include a plurality of support blocks 21 which are fixed to the conveyor chain 15 at equally spaced intervals along the length of the chain and carton holding brackets generally designated at 22 which are detachably secured to the support blocks. Each support block 21 is generally cubical in exterior configuration and includes a

groove 23 formed in a rear wall thereof to receive a portion of the conveyor chain. The block is fixed to the conveyor chain through appropriate screws or the like. The top and bottom of each support block have grooves 24 and 25 extending generally parallel to the groove 23 and to the chain, and which are adapted to receive guide rail facilities as illustrated in FIG. 10. The guide rails, as illustrated in FIG. 10, are defined by upper and lower, elongated and parallel strips 26 and 27 of a low friction material such as NYLATRON. Other low friction materials may be used. A pair of such rails are supported on the frame of the machine to support substantially the entire length of each free run of the conveyor chain between the sprockets 16 and 17. Suitable brackets 28 and 29 may be carried by the frame of the machine to hold the guide rails in position.

Each of the support blocks 21 includes projections 30 and 31 on opposite sides of the block and extending generally parallel to the length of the chain 15 near the front face of each support block. A spring biased ball detent 32 is seated in a bore in the support block and projects forwardly of the front face of the block. The blocks 21 may be formed from a lightweight material such as hard coated aluminum or aluminum with antifriction wear resistant surfaces.

Each carton holding bracket 22 is defined by plate stock and preferably made from a light gauge material such as 11 gauge stainless steel. Each bracket is comprised of an inner flat section 33 having a length corresponding to the length of a carton blank to be accommodated. It may have a depth equal to or less than the carton blank accommodated. Wing sections 34 and 35 extend transversely to the section 33 at a spacing corresponding to the length of the carton accommodated and extend outwardly from the face of the section 33 by a distance corresponding approximately to the width of cartons. The rear face of the carton bracket includes spaced flange elements 36 and 37 which are adapted to snugly embrace the sides of the blocks 21. These flanges are conveniently defined by plate stock which is bent into a generally U-shaped configuration as illustrated in FIG. 4 and with the medial section welded or otherwise suitably attached to the rear face of section 33. Each of the flanges 36 and 37 includes a groove 38 (FIG. 5) which leads inwardly from the rear edge 39 of these flanges and then upwardly at right angles, as designated at 40. The grooves correspond generally to the size of the projections 30 and 31 so that a carton holding bracket may be fixed to a support block by moving the flanges inwardly with the projections 30 and 31 aligned with the entrance to the grooves. When the grooves move over the projections 30 and 31 to a point where the projections are aligned with the right angular portions 40 of the grooves, the brackets are moved downwardly until the projections 30 and 31 occupy a position represented in dotted outline at 31 in FIG. 5.

The rear face of the flange defining element includes a depression 41 which is sized to receive the ball detent 32, and located so that when the projections 30 and 31 are in the final position illustrated in FIGS. 5 and 6 the ball snaps into the depression 41 to lock the carton holding bracket on the support block. The carton holding bracket is thus removably secured to the support block at three spaced points.

A carton holding bracket may be removed from its support block by a combined upward and slight tilting motion. The bracket is easily attached to the block by the simple inward and downward motion aforementioned. It should be noted that any tilting motion of the bracket, when carried by the chain, is resisted by the outer guides 20.

Different sizes and shapes of carton holding brackets may thus be easily attached to and removed from the conveyor chain. For all sizes of carton holding brackets the plane of reference is the front face of the support blocks 21. This is illustrated by the different sizes and shapes of carton holding brackets 22*a*, 22*b* and 22*c* in FIG. 9. Each bracket is shown as fixed to supporting blocks 21 which are fixed to the conveyor chain. With respect to FIG. 9 it should be understood that the different brackets shown are not intended as representing different sizes of brackets in use at the same time on the same chain. The illustration is intended to show the plane of reference 42, as the plane of reference for each different carton holding bracket utilized in the machine. This plane passes through the front face of each block 21. By utilizing the plane of reference 42, the amount of weight acting downwardly to one side of the support chain may be reduced considerably over that encountered when carton holding brackets are formed around a fixed center line which is generally designated at 43. The dotted representations 43*a*, 43*b* and 43*c* illustrate the outline of cartons and carton holding brackets which are required if the brackets are located on a center spaced outwardly from the support blocks and aligned with a filler opening. It will be appreciated that when the outer plane of reference is used, all but the largest cartons used require additional holding facilities in the form of spacers, etc., and this weight must exist between the supports on the chain and the carton holding brackets, all of which produces additional weight acting in cantilever fashion on the chain. By positioning carton holding brackets on a plane of reference 42 defined by the outer face of the chain blocks 21, the center of weight at the side of the chain is much closer to the chain and the cantilever forces are reduced. This result is further emphasized by using relatively lightweight brackets attached to the front of the support blocks as herein described.

It might be noted that the centering of all cartons, regardless of size and shape, along an outer center line might seem desirable from the standpoint of aligning this center line with the center of a filler opening such as 18 when the opening is in aligned and initial filling relation to a carton but this is unnecessary since fillers usually utilize spouts beneath the opening and different spouts are customarily utilized for each different size and shape of carton being filled. Typical filling spouts for such cartons are illustrated in FIGS. 7 and 8 at 44.

Furthermore, by using the fixed inner plane of reference, as herein described, the inner carton flap folders in the machine do not have to be relocated when changing from one carton size to another. Some adjustment may be required but relocation is not a necessity. This is in marked contrast to prior machines using the outer plane of reference because in those machines both inner and outer flap folders must be relocated when the machine is changed from one carton size to another.

I claim:

1. Carton holding and conveying facilities for carton filling and forming machines of the type in which an endless conveyor chain conveys spaced carton blanks past a filling station comprising an endless carton conveyor chain and support blocks at equally spaced intervals on said chain, each support block having a front face and a carton holding bracket detachably carried by each block with each bracket having a wall in flush engagement with the front face of each block, each bracket including a rear wall corresponding in size to the length of a carton to be carried, and portions extending at right angles to said rear wall in spaced relation, said portions having dimensions corresponding to the width dimensions of cartons to be accommodated, each bracket having flanges snugly embracing the sides of said block, each block and bracket having interfitting groove and projection means at the sides of said block and said flanges so as to enable a detachable connection between each bracket and block.

2. The structure of claim 1 wherein said groove and projection means includes projections extending from each side of each block and grooves carried by said flanges, said grooves being of multiangular configuration relative to the face of said blocks so as to enable said projections to be locked within said grooves.

3. The structure of claim 2 characterized by and including spring biased detent and recess means carried by said brackets and the front face of said blocks so as to resiliently lock said brackets to said blocks.

4. Chain supported block and carton holding bracket means for conveying carton blanks to a filling station for said cartons, including a plurality of chain supported blocks providing a

plane of reference at an outer face of each block, and a plurality of interchangeable carton holding brackets of different sizes for use with said blocks, each carton holding bracket including a rear wall section of the same thickness and formed and adapted to be positioned in flush relation to the front face of said blocks, each bracket further including means for removably securing each bracket to each block, the rear wall of each bracket corresponding in length to the length of a carton blank, each carton bracket including spaced portions extending at right angles from said rear wall and having sizes corresponding to the width of carton blanks to be accommodated, the dimensions of said rear walls and right angular portions of each bracket being different from bracket to bracket while the thickness of said rear wall and extensions is essentially the same.

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